

THAT WHICH IS CLAIMED IS:

1. A method of producing a transformed dicotyledonous plant, comprising:

(a) culturing a tissue of a dicotyledonous plant recalcitrant for transformation on a culture medium to produce a multiple shoot culture from the tissue;

(b) introducing a nucleic acid into a cell of the multiple shoot culture, thereby producing a transformed cell comprising the nucleic acid; and

(c) regenerating a transformed plant from the transformed cell.

2. The method according to Claim 1, wherein the tissue is meristematic tissue.

3. The method according to Claim 2, wherein the meristematic tissue is excised from a shoot apex, an axillary bud or a floral meristem.

4. The method according to Claim 1, wherein the tissue is callus tissue.

5. The method of Claim 1 wherein the plant is a member of the *Cucurbitaceae* family or of the *Chenopodiaceae* family.

6. The method of Claim 1 wherein the plant is selected from the group consisting of sugar beet, sunflower, soybean, cotton, melons, watermelon, squash, *Brassica* and pepper.

7. The method of Claim 1 wherein the plant is sugar beet, squash, melon or watermelon.

8. The method of Claim 1 wherein the tissue is excised from the shoot tip of a seedling of the plant.

9. The method of Claim 1, wherein the culture medium comprises at least one plant growth regulator.

10. The method of Claim 9, wherein the at least one plant growth regulator is a cytokinin.

11. The method of Claim 9, wherein the concentration of growth regulator in the culture medium is between about 0.01 mg/L to about 25 mg/L.

12. The method of Claim 1, wherein the nucleic acid is introduced into the cell by microparticle bombardment or using a bacterium belonging to the genus *Agrobacterium*.

13. The method of Claim 1, wherein the nucleic acid comprises a nucleic acid that is heterologous to the dicotyledonous plant.

14. The method of Claim 1, wherein the nucleic acid comprises a gene that encodes a polypeptide having PPO activity.

15. The method of Claim 1, wherein the nucleic acid comprises a gene that encodes a polypeptide having phosphomannose isomerase (PMI) activity.

16. The method of Claim 1, wherein the nucleic acid comprises a gene that encodes a polypeptide having xylose isomerase (xylA) activity.

17. The method of Claim 1, wherein the nucleic acid comprises a gene that encodes a polypeptide having GUS activity.

18. The method of Claim 1, wherein step (c) comprises:
selecting a multiple shoot culture comprising a transformed cell;

growing the multiple shoot culture under conditions that promote shoot elongation to produce at least one transformed shoot; and then
growing the at least one transformed shoot into a mature transformed plant.

19. The method of Claim 18 wherein the at least one transformed shoot grows into a mature transformed plant after growing the at least one transformed shoot on a medium that promotes root formation.

20. The method of Claim 1, wherein the step (c) comprises:
selecting a multiple shoot culture comprising a transformed cell;
growing the multiple shoot culture under conditions that promote shoot elongation to produce at least one transformed shoot;
cloning the at least one transformed shoot; and
allowing the cloned shoot to mature into a transformed plant.

21. The method of Claim 20 wherein the cloned shoot grows into a mature transformed plant after growing the cloned shoot on a medium that promotes root formation.

22. A transformed plant cell produced by the method of claim 1.

23. A multiple shoot culture produced by the method of claim 1.

24. A transformed plant produced by the method of claim 1.

25. The transformed plant according to Claim 24, wherein the plant is a squash plant that expresses a polypeptide having PMI activity.

26. The transformed plant according to Claim 24, wherein the plant is a melon plant that expresses a polypeptide having PMI activity.

27. The transformed plant according to Claim 24, wherein the plant is a watermelon plant that expresses a polypeptide having PMI activity.

28. The transformed plant according to Claim 24, wherein the plant is a sugar beet plant that expresses a polypeptide having PPO activity.

29. A seed produced by the transformed plant of Claim 24, wherein the seed comprises the nucleic acid transformed into the multiple shoot culture.

30. A method of producing a plant comprising a transformed plastid genome, comprising:

(a) culturing a tissue of a plant on a culture medium to produce a multiple shoot culture from the tissue;

(b) introducing a nucleic acid into a plastid genome of a cell of the multiple shoot culture, thereby producing a transformed plastid genome of said cell comprising the nucleic acid; and

(c) regenerating a transformed plant from the transformed cell.

31. The method according to Claim 30, wherein the tissue is meristematic tissue.

32. The method according to Claim 30, wherein the meristematic tissue is excised or derived from a shoot apex, an axillary bud or a floral meristem or leaf tissue.

33. The method according to Claim 30, wherein the tissue is callus tissue.

34. The method of Claim 30 wherein the plant is a dicotyledonous plant.

35. The method of Claim 30 wherein the dicotyledonous plant is sugar beet, tobacco or tomato.

36. The method of Claim 30 wherein the tissue is excised from the shoot tip of a seedling of the plant.

37. The method of Claim 30, wherein the culture medium comprises at least one plant growth regulator.

38. The method of Claim 37, wherein the at least one plant growth regulator is a cytokinin.

39. The method of Claim 37, wherein the concentration of growth regulator in the culture medium is between about 0.01 mg/L to about 25 mg/L.

40. The method of Claim 30, wherein the nucleic acid is introduced into the cell by microparticle bombardment.

41. The method of Claim 30, wherein the nucleic acid comprises a nucleic acid that is heterologous to the dicotyledonous plant.

42. The method of Claim 30, wherein step (c) comprises:
selecting a multiple shoot culture comprising a transformed cell;
growing the multiple shoot culture under conditions that promote shoot elongation to produce at least one transformed shoot; and then
growing the at least one transformed shoot into a mature transformed plant.

43. The method of Claim 42 wherein the at least one transformed shoot grows into a mature transformed plant after growing the at least one transformed shoot on a medium that promotes root formation.

44. The method of Claim 30, wherein the step (c) comprises:
selecting a multiple shoot culture comprising a transformed cell;
growing the multiple shoot culture under conditions that promote shoot
elongation to produce at least one transformed shoot;
cloning the at least one transformed shoot; and
allowing the cloned shoot to mature into a transformed plant.

45. The method of Claim 44 wherein the cloned shoot grows into a
mature transformed plant after growing the cloned shoot on a medium that
promotes root formation.

46. A transformed plastid genome produced by the method of claim
30.

47. A plastid comprising a transformed plastid genome of claim 46.

48. A transformed plant cell comprising a plastid genome of claim 46.

49. A transformed plant comprising a plant cell of claim 48.

50. A seed produced by a transformed plant of claim 49, wherein the
seed comprises the nucleic acid transformed into the multiple shoot culture.